

# COMPETITION AND CO-EXISTENCE IN GRIFFON VULTURES: *GYPSS BENGALENSIS*, *G. INDICUS* AND *G. FULVUS* IN GIR FOREST

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## INTRODUCTION

If two (or more) different species populations require a common resource that is potentially limited and actually becomes so, they are said to be in competition for it (Gause 1934). When such a situation arises one of the species would eliminate all others directly or through competitive exclusion resulting in ecological isolation. Therefore congeneric species are known to be isolated from each other by range, habitat or feeding habits (Lack 1971). A world review of birds with reference to co-existence of congeneric species by Lack (1971) shows only one exception where two species (*Calidris melanotos* & *C. alpinus*) with identical feeding habits share the same range and habitat for a short period, of 10 to 12 weeks, but that is attributed to temporary supply of superabundant food. Subsequent workers (Vijayan 1975 on 2 species of bulbuls—Pycnonotidae, and Houston 1975 on 6 species of East African vultures) too have added fresh data to strengthen the theory of ecological isolation originally put forward by Gause and further developed by others as shown above.

However, while the theory by itself is logical and on firm grounds, its definition needs

to be made more comprehensive in order to explain additional factors hitherto not considered. For instance Kruuk (1967) who observed six species of vultures (Aegypiinae) feeding at carcasses in the Serengeti National Park found that although they all eat off the same carcass, they feed upon different items in the carcass and their feeding techniques also differ. Accordingly he separated the six species into 3 different categories of feeders, 2 species in each category. But he did not go further to explain how the two species in each category sorted themselves out. We get more information on these birds from Houston (1975) who treats individual species in each pair separately and demonstrates how these species have distinctly different feeding habits in spite of the superficial resemblance. However, with the griffon vultures (*Gyps africanus* and *Gyps rupellii*) he found them to have identical feeding habits wherever they occurred together. He justifies their being found together in the Serengeti by the fact that it is only an overlapping area of distribution. Otherwise the large body size of the *rupellii* confines its distribution to hilly terrain while the smaller *africanus*, not so dependent on gliding flight, can feed with equal ease in the plains. Yet this 'overlapping' area is big enough to hold a large and fairly stable population of feeding griffons comprising these two species. Considering the size of the area and

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the population of griffons involved it would be more reasonable to try and explain how these two species manage to co-exist in the Serengeti rather than put it away as an 'overlapping' area.

The scope of this paper is to discuss the factors that evidently control a very similar situation in the Gir Forest (Western India) in which three species of griffons are involved: the Indian whitebacked *Gyps bengalensis*, the longbilled *G. indicus*, and the fulvous griffon *G. fulvus*.

### OBSERVATIONAL METHODS

The observations included a study of the status and distribution of vultures in the Gir, their population and the feeding habits. Observational methods consisted mostly of observation of the vultures in the wild with unaided eyes or using field binoculars or a portable hide. Captive birds were observed to a limited extent. For details of the methods, see Grubh (1974). The entire study lasted for about 23 months, from September, 1970 to July, 1972.

### STUDY AREA AND STATUS OF THE GRIFFONS

The Gir Forest is a hilly terrain of c. 1265 km.<sup>2</sup> area (in 1971-72) having mixed dry teak and savannah, deciduous forest. For more details of the study area, see Grubh, 1978. The Gir accommodates approximately 440 griffon vultures (*Gyps* spp.) at a time in the dry season, from November to May, and 350 griffons from June to October in the wet season. The species composition of the whitebacked, long-billed and fulvous during the dry season is 85%, 8% & 7%, respectively. Indistinguishable feeding habits and uniform distribution within the Gir enable these species to share the same habitats for feeding. The fulvous griffon being a migrant, stays in the Gir only for a little more than 6 months, and hence

the wet season finds only the whitebacked and longbilled, their population at that time being about 90% and 10% respectively. (Grubh 1974). We will take that period, when all the 3 species of griffons occur together, for most of the discussion below.

### RESULTS AND DISCUSSION

The investigation was carried out with reference to A. the extent of competition among the species, B. interspecific dominance and C. the different factors that enable the species to live together.

#### A. Extent of competition:

Among the different areas of probable competition, the important ones here are food supply, nesting sites, and roosting sites.

1. *Food supply*: On an average only about 8.3 carcasses were available per day during the season and the quantity of meat available from these carcasses, not many of which were intact, was probably just sufficient for the approximately 440 griffon vultures found here (Grubh 1974). With this limited food supply it is obvious that the vultures have to compete for food.
2. *Nesting sites*: None of the 3 griffons nest within the Gir. The fulvous is purely a migrant from outside the state of Gujarat. The longbilled and the whitebacked nest in the neighbourhood of the Gir more or less side by side, but with a difference: the whitebacked nest in trees and the longbilled on cliffs, and hence both are isolated from any possible competition for nesting sites.
3. *Roosts*: Trees and cliffs were used for roosting. While all the three species of griffons roosted on trees, the longbilled and, to a greater extent, fulvous griffons also roosted on cliff faces. But there are only

two widely separated cliffs (Charakio and Nandivilla) within the Gir and these were occupied mostly by the fulvous griffons. Whereas the common roosting trees namely *Sterculia urens*, *Boswellia serrata* & *Ficus* spp. were in abundance and hence necessitated no competition, the roosting cliffs, being limited within the Gir, could be a factor causing a certain amount of competition among these two species. However, the fact that there were very few longbills on these two cliffs, even when the fulvous griffons had migrated out, suggests that the fulvous and the longbilled did not actively compete for roosts within the Gir.

**B. Interspecific dominance:**

When assembled at carcasses, the griffons exhibited varying degrees of dominance according to their body size: the largest bird (fulvous) being the most dominant and the smallest (whitebacked) the least.

TABLE 1

INTERSPECIFIC DOMINANCE AMONG GRIFFONS IN THE GIR (N. 74).

Opponents	Total attempted assaults	Percentage of attempts won (In most cases the winners had also initiated the assault)
F × L	15	F 67% L 33%
F × W	7	F 86% W 14%
L × W	52	L 62% W 36%

F: Fulvous; L: Longbilled; W: Whitebacked

**C. Factors enabling coexistence:**

1. *Extraneous factors limiting the population of the larger species and effecting the present species composition:*

Since competition among species is evident only at feed it would be expected that the

species composition should be directly proportionate to the level of dominance among the species at least until the most dominant species has successfully eliminated the others from the area. Yet the whitebacked form 85% of the griffon population, the longbilled 8% and the fulvous 7%. This situation needs to be explained. We will first take the case of the longbilled:

The longbilled and the whitebacked, being resident species, breed in the outskirts of the Gir, but prefer different nesting habitats. The whitebacked nests mostly in coconut trees *Cocos nucifera*, Tamerind *Tamarindus indicus*, and trees of the genus *Ficus*, in the plains, around the Gir. The longbilled on the other hand was noticed to be nesting only in the cliffs of the Girnar in the neighbourhood of the Gir. While nesting trees are available in great abundance, nesting cliffs are limited. Although it is not known why only some of these cliffs are used and whether the longbilled is exploiting the optimum number of potential nesting sites, the fact that these cliffs are so limited in the neighbourhood shows that the availability of nesting sites can be a limiting factor for this species.

The population of the fulvous griffon, another cliff nester too may be controlled by this factor, but being a migrant from outside the state, whose status has not been fully understood yet, we cannot explain why they come to Gir in such small numbers. That the scarcity of suitable nesting sites could affect the numerical abundance of a species is also shown by Kruuk (1967) for Ruppell's griffon in the Serengeti.

Thus, we find that the longbilled and the fulvous griffons have not increased in number within the Gir in spite of their being

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more dominant species. Consequently the whitebacked vulture forms the major bulk of the griffons here, and its number is evidently controlled only by food supply and interspecific competition. The food supply being limited, the number of whitebacked foraging within the Gir would be decided largely by the number of fulvous and long-billed griffons that occur inside the Gir at any one time. Since the proportion of meat consumed by individual fulvous, longbilled and whitebacked is approximately of the ratio of 9:7:6 (based on captive birds from the Gir) the actual number of whitebacked that might be displaced by the other two species can be determined by considering individuals of the different species with reference to their feeding capacity.

The longbilled and the fulvous perhaps do not influence each others number at the feeding grounds as their present numbers are much too small due to the extraneous factors mentioned earlier.

2. *Intraspecific behavioural interaction at feed:*

Since the whitebacked is the least dominant species it would be of interest to know how the individuals obtain their food when they are at a carcass along with the other two species. When compared with the whitebacked, the fulvous and the longbilled griffons spend a considerable amount of

time quarrelling with their own kind at feeding sites, over food.

While interspecific fights (being between unequal opponents) do not usually last for more than a second, fights between individuals of the some species often last for more than five seconds with a great deal of screeching and other agonistic displays. Each bout of such a fight temporarily debars the fighting birds from feeding. These moments are effectively exploited by the weaker species in obtaining food. Here we find intraspecific behavioural interaction to be a factor contributing towards the co-existence of these species.

In addition to this, the weakest of the three—the whitebacked— has another advantage i.e. its numbers. Its very number and determination to consume food do at times hold back the more dominant species which just stand around and watch them feeding, though not for long.

CONCLUSION

The above discussion indirectly points out that where there is competition for a common resource, one of the competing species may eliminate all others directly or through competitive exclusion only when all the competing species have equal chance to obtain all the biological requirements although there may not be any interspecific competition for these items.

TABLE 2  
FREQUENCY OF FIGHTS WITHIN SPECIES

Species	Birds (No.)	Total fights	Obs. period (Minutes)	Interval between fights per pair
Whitebacked	314	61	32.6	84 minutes
Longbilled	128	116	37.3	21 minutes
Fulvous	12	6	47.0	47 minutes

Also, it is found that the extent of advantage gained by a species by its dominance over others can be offset by its intraspecific behaviour. To be short, coexistence among congenetic species is possible even when the common resource is limited under certain situations.

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